

DATE: January 24, 2018

TO: Big Quinnesec Flowage

FROM: Michael Donofrio

SUBJECT: 2017 Big Quinnesec Flowage Electroshocking Surveys

Big Quinnesec Flowage is an impoundment created by the Big Quinnesec hydroelectric dam on the Menominee River (boundary water with Michigan). The dam is owned and operated by the We Energies and licensed through the Federal Energy Regulatory Commission. Little Quinnesec flowage is immediately downstream and Kingsford dam is several miles upstream. Big Quinnesec is located less than one mile west of the City of Niagara in northeastern Marinette County (Appendix). These lakes are commonly known as Big Q and Little Q.

Big Quinnesec dam is operated in a modified peaking scenario. In 2001, the Federal Energy Regulatory Commission re-licensed the Big Quinnesec Hydroelectric Project operated by We Energies. A license article requires, We Energies to release from the Big Quinnesec project from June 16 through April 9 a minimum flow into the Menominee River below the project that, in any day, is not less than 50 percent of the maximum flow on the same day. The project operated at run-of-river mode from April 10 through June 15. The pool elevation is maintained between 1033.4 feet and 1034.9 feet above sea level.

The last electrofishing surveys occurred as three events in 2009 with similar effort to the 2017 surveys (Donofrio 2010). Electrofishing was also performed in 1995. A comprehensive survey (electrofishing and fyke netting) was performed in 1989. The conclusions from that 1989 survey were: 1) good northern pike and smallmouth bass populations, 2) very good potential as a walleye fishery, and 3) developing quality largemouth bass population. Fishing pressure was characterized as light to moderate (Thuemler and Schnicke, 1993). This report will include comparisons to the 2009 surveys. The only recorded stocking event by Michigan and Wisconsin were walleye fry in 1941.

The lake has a surface area of approximately 127 acres. The maximum depth is 73 feet and 2% of the lake is less than 3 feet in depth. It has 4.4 shoreline miles. The literal substrate is 50% boulder, 40% sand and 10% rubble. Aquatic vegetation is isolated to a few shallow bays and is composed of approximately 50% emergent and 50% submergent. Eurasian watermilfoil is present. The shoreline is undeveloped and mostly owned by We Energies. We Energies maintains the only public boat access site off Hydraulic Falls Road (near Iron Mountain, MI).

METHODS

Data collection

A WDNR standard direct current electrofishing boat was used to sample 90% of the shoreline on three dates (May 3, June 1, and September 20, 2017) (Appendix). That effort and protocol is comparable between the 2009 and 2017 surveys (April 28, June 8 and October 2 in 2009) (Table 1). The April-May and September- October surveys in both years targeted walleye while the June surveys focused on bass and panfish. For the June surveys, all fish captured were identified to species and counted for the first ½ mile and only game fish during the succeeding 1.5 miles each evening. Total length of gamefish and a sub-sample of panfish were measured to the nearest 0.1 inch. Scales or dorsal spines were collected from a sub-sample of fish stratified within 0.5 inch bins. Ages were assigned to fish after scales and spines were aged using standard WDNR procedures.

Data analysis

Total catch and catch per gear type was calculated for all species. Length frequency distributions were performed for walleye, smallmouth bass, and rock bass. A subsample of walleye, smallmouth bass, bluegill and yellow perch were aged for comparisons. The electrofishing settings were 276-330 volts, 6-13 amps, a pulse rate of 60 and duty cycle from 20-25%.

RESULTS AND DISCUSSION

The electrofishing surveys occurred along 4 miles of shoreline in 2009 and 3.75 miles in 2017. The effort for each survey in 2009 was 2 hours compared to 1.75 hours for each 2017 survey. In 2017, we captured 179 individual fish representing 8 species during the 3 shocking surveys (Table 1). The species diversity was similar for both 2009 and 2017 but species abundance (CPE or fish per mile) varied. More fish were caught in 2009 for the June and Fall surveys compared to 2017. The water temperature at the time of the evening surveys was 47 F on May 3rd, 61 F on June 1st and 65 F on September 20th.

Total CPE was higher in 2009 (26.3) compared 15.6 fish per mile in 2017 (Table 2). The dominant species in our catch were Walleye, Smallmouth Bass, and Rock Bass. Yellow Perch were present in 2017 but more abundant in 2009. Northern Pike, Muskellunge, Largemouth Bass and Bluegill were captured in lower numbers in 2009 and 2017. Other fish observed in 2009 and 2017 were mottled sculpin, pumpkinseed, and white sucker while golden shiners. White suckers were only observed in 2017.

Gamefish

In 2017, 77 walleye that were collected during the 3 surveys ranged in size from 4.3 inches (in) to 23.1 inches with an average length of 11.0 in (Table 2). Only seven of the walleye (9%) were longer than the 15 inch minimum size limit (Figure 1). The size distribution was similar in 2009 when the mean length was 9.5 inches and the size range was 4.9 to 26.1 inches. Analysis of aging structures taken from a subsample of 73 walleye indicated that ages 0 through 8 were present in our sample (Table 3). Ages 1 and 4 walleye were the most common ages in our sample followed by age 3. Length at age comparison between walleye in Big Quinnesec to northern Wisconsin data was determined with the aging data (Table 4). Survey data indicated that walleye in Big Quinnesec Flowage appear to be growing slower than other northern Wisconsin lake average rates. Based on the age and length distribution, recruitment was evident in 2009 and 2017. The length frequency of walleye for both years indicated recruitment was evident. These data also demonstrated that the majority of Walleye were smaller than the 15 inch minimum length limit.

In 2017, 49 Smallmouth Bass that were collected during the surveys ranged in size from 5.1 to 17.6 inches and had an average length of 12.2 inches. The size range was similar for 2009 (6.0 to 17.5 inches) but the average size was smaller at 11.0 inches. For 2017, 15 of the smallmouth bass (31%) were longer than the 14 inch minimum size limit (Figure 2). The size distribution and total number of Smallmouth Bass was similar for 2009 and 2017 survey years. Analysis of aging structures taken from a subsample of 41 Smallmouth Bass indicated that ages 1 through 14 were present in our sample (Table 5). Age 7 Smallmouth Bass were the most commonly aged bass in our sample followed by ages 6 and 8. Length at age comparison between Smallmouth Bass in Big Quinnesec Flowage to northern Wisconsin averages can be made with the aging data that we collected to determine how bass are growing in the impoundment (Table 6). Smallmouth Bass were 7-8 years old before beginning to reach the minimum size limit. Survey data indicates that Smallmouth Bass in Big Quinnesec Flowage appear to be growing at a slower rate than other northern Wisconsin average rates. Based on the age and length distribution, Smallmouth Bass recruitment was evident in 2009 and 2017.

Other gamefish in 2017 included 6 Northern Pike, 2 Muskellunge and 1 Largemouth Bass. Similar numbers of pike and musky were observed in 2009 but more Largemouth Bass were captured in 2009 (22). The pike ranged in size from 10.9 to 22.9 inches and the average length was 16.1 inches. The Muskellunge were 11.9 and 18.4 inches. Aging structures were not collected from the pike and musky. A single Largemouth Bass was captured at 15.3 inches and aged at 7.

Panfish

Rock Bass were the dominant panfish captured during the both surveys. The sample of 27 Rock Bass ranged in length from 2.8 in to 8.3 inches and had an average length of 5.7 inches. Twelve of the 27 (44%) Rock Bass had a length greater than 6 inches (Figure 3). In 2009, the length range was 2.5 to 9.5 inches with an average length of 6.0 inches. Rock bass were not aged.

Nine Yellow Perch that were collected during the 2017 surveys ranged in size from 2.8 in to 8.2 inches. Those fish had an average length of 5.2 inches (Table 6). Only 2 of the nine perch (22%) were longer than the 8 inch (quality size). Yellow Perch were more common (42) in 2009 but not as abundant as during surveys in the 1995 when 339 perch were measured. In 2009, the length range was 3.5 to 8.0 inches and the average size was 6.1 inches. 2017 analysis from a subsample of 6 perch indicated that ages 2 and 5 were present. The age 2 perch represented a majority of the fish (N= 4) and the average length was 4.7 inches while the age 5 perch (N=2) had an average length of 8.1 inches. Both values indicate these Yellow Perch have similar growth rates compared to other northern Wisconsin Yellow Perch populations.

Fewer Bluegill (9 in 2009 and 8 in 2017) were captured in these surveys. In 2017, that species ranged from 2.8 to 7.9 inches and the average length was 5.4 inches. 38% of the Bluegill were at least 7 inches in length. While in 2009, the size range was 4.0 to 6.5 inches and the mean length was 5.8 inches. Analysis of a subsample of 5 Bluegill from 2017 revealed two were aged at 2 years and had an average length of 3.9 inches. Three Bluegill were aged at 5 years with an average length of 7.1 inches. Those averages indicated better growth in Big Quinnebec than Bluegill aged from other waters in northern Wisconsin (average of 3.7 for age 2 and 6.4 for age 5). Black Crappie were not present in 2009 and 2017 but were observed in earlier surveys (1989 and 1995).

CONCLUSIONS

Big Quinnebec flowage is difficult to survey primarily because of sharp drop offs and dominant deep waters (only two percent of the basin is less than three feet in depth). In most cases, we had to maneuver the boat very close to shore to be effective (booms and boat less than 5 feet from the rock cliffs). We did not traverse upstream into the river channel. Some rapids and likely good spawning habitat exists for a variety of species in the 5 miles upstream before Kingsford Dam (next upstream dam).

Overall, the fishery of Big Quinnebec Flowage appears to be in good condition. In 2017, three electrofishing events on this flowage indicated a fishery with good Walleye and Smallmouth Bass populations. The 2009 and 2017 surveys demonstrated strong evidence of Walleye and Smallmouth Bass recruitment in this flowage. The panfish community is supported by good numbers of Rock Bass although Yellow Perch and Bluegill were observed in lower numbers. Pumpkinseed and Black Crappie were present during the 1990s fish surveys but absent in 2009

and 2017. The 2009 and 2017 surveys also documented low numbers of Northern Pike and Muskellunge.

In 2010, my comments were that the regulation of the hydro-electric facilities and the subsequent stabilization of the water level appear to have had a positive effect on improving the fishery since the new FERC license was issued in 2001. Additional fisheries habitat improvements such as shoreline restoration and the addition of coarse woody structure may increase fish recruitment and growth rates although the lack of a good littoral zone on this flowage would make those improvements difficult. Those statements still apply in 2017.

This flowage offers anglers a diverse fishery with evidence of good recruitment for several species. The current regulations appear appropriate for this impoundment especially with apparent light fishing pressure. I would recommend electrofishing surveys of Big Q in 8-10 years. Public access to Big Quinnesec Flowage is adequate. I would recommend no improvements to the current boat landing facility. There are also public shore fishing opportunities. This impoundment is located in an undeveloped setting, close to US Highway 141 and the City of Niagara, WI and Iron Mountain, MI.

ACKNOWLEDGMENTS

Cory Wienandt and Michael Vaske assisted with data collection, aging of fish structures and entered the data into the state database. Jennifer Johnson of Michigan DNR assisted in the field.

REFERENCE

Donofrio, M.C. 2010. Big Quinnesec Flowage, Marinette County, Wisconsin Fisheries Survey Report, 2009. Wisconsin Department of Natural Resources, Peshtigo, WI 13 pp.

Thuemler, T.F. and G. Schnicke. 1993. Menominee River Fisheries Management Plan, File Report. Wisconsin Department of Natural Resources, Marinette, WI 51 pp.

Table 1. Electrofishing Survey Statistics in 2009 and 2017 for Big Quinnebec Flowage, Wisconsin-Michigan.

Description	May 3 2017	April 28 2009	June 1 2017	June 8 2009	September 20 2017	October 2 2009
Effort (miles)	3.75	4	3.75	4	3.75	4
Effort (hours)	1.75	2	1.75	2	1.75	2
No of Fish	53	51	117	179	26	81
Water Temperature (F)	47	45	61	58	65	52

Table 2. Catch summary from 2017 and 2009 electrofishing surveys of Big Quinnebec Flowage, Wisconsin- Michigan. CPE is fish per mile. Total effort 12 miles in 2009 and 11.25 in 2017.

		2017				2009		
Species	Number Caught	CPE	Mean Length (inches)	Size Range	Number caught	CPE	Mean Length (inches)	Size Range
Yellow Perch	9	0.8	5.2	2.8-8.2 in	42	3.5	6.1	3.5-8.0
Rock Bass	27	2.4	5.7	2.8-8.3 in	63	5.3	6.0	2.5-9.5
Bluegill	10	0.9	5.4	2.8-7.9 in	9	0.8	5.8	4.0-6.5
Smallmouth Bass	49	4.4	12.2	5.1-17.6 in	41	3.4	11.0	6.0-17.5
Walleye	77	6.8	11.0	4.3-23.1 in	152	12.7	9.5	4.9-26.1
Northern Pike	6	0.5	16.1	10.9-22.9 in	7	0.6	17.2	12.4-26.7
Muskellunge	2	0.1	15.0	11.5-18.4 in	2	0.1	11.6	11.1-12.1
Largemouth Bass	1	0.1	15.3	---	22	1.8	11.6	9.1-18.1
Total	181	15.6			338	26.3		

Table 3. The size and age distribution of walleye captured during the May- September 2017 electrofishing surveys of Big Quinnesec Flowage, Wisconsin- Michigan. Standard Deviation is S.D.

Length (in)	Number	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8
4	1	1								
5	7		7							
6	8		8							
7	2		2							
8	2		2							
9	3		1	2						
10	12			2	8	2				
11	13				2	11				
12	9					9				
13	8					6	2			
14	4						1	3		
15	1						1			
16	0									
17	0									
18	0									
19	1								1	
20	1								1	
21	0									
22	0									
23	1									1
Total	73	1	20	4	10	28	4	5	2	1
Average Lt	10.8	4.3	6.5	9.9	10.7	12.1	14.5	14.5	20.2	23.1
S.D.	3.6	-	1.0	0.2	0.45	0.9	1.1	0.3	0.4	-

Table 4. Average length at age for walleye captured during electrofishing surveys in 2017 on Big Quinnesec Flowage. Average length at age information from WDNR northern region database 2014 and lengths are inches.

Species	AGE 0	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8
Walleye 2017	4.3	6.5	9.9	10.7	12.1	14.5	14.5	20.2	23.1
Northern Average 2014	-	6.7	9.6	11.5	13.5	15.1	16.7	18.3	19.8

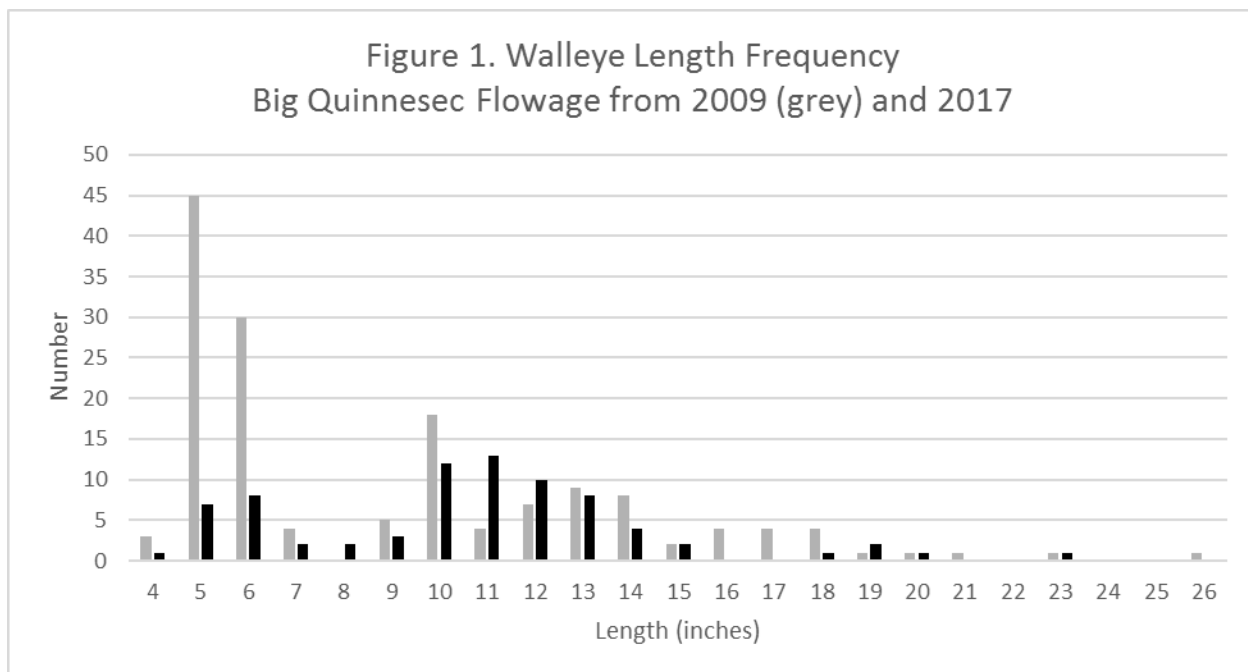


Table 5. The size and age distribution of smallmouth bass captured during the May-September 2017 electrofishing surveys of Big Quinnesec Flowage, Wisconsin- Michigan. One fish each were assigned ages 11 (16.7 inches), 12 (16.2) and 14 (17.6). Standard deviation is S.D.

Length (in)	Number Aged	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10
5	1	1									
6	0										
7	3		1	2							
8	2		1			1					
9	2			1	1						
10	4				2	2					
11	5					1	2	2			
12	9						5	3	1		
13	3							3	0		
14	7							3	3	1	
15	3							1	1	1	
16	2										2
Total	41	1	2	3	3	4	7	12	5	2	2
Average Length	12.3	5.1	7.8	8.0	10.2	10.1	12.0	13.3	14.1	15.4	15.6
S.D.	2.8	-	0.8	1.4	0.4	1.1	0.2	1.1	1.1	0.6	0.2

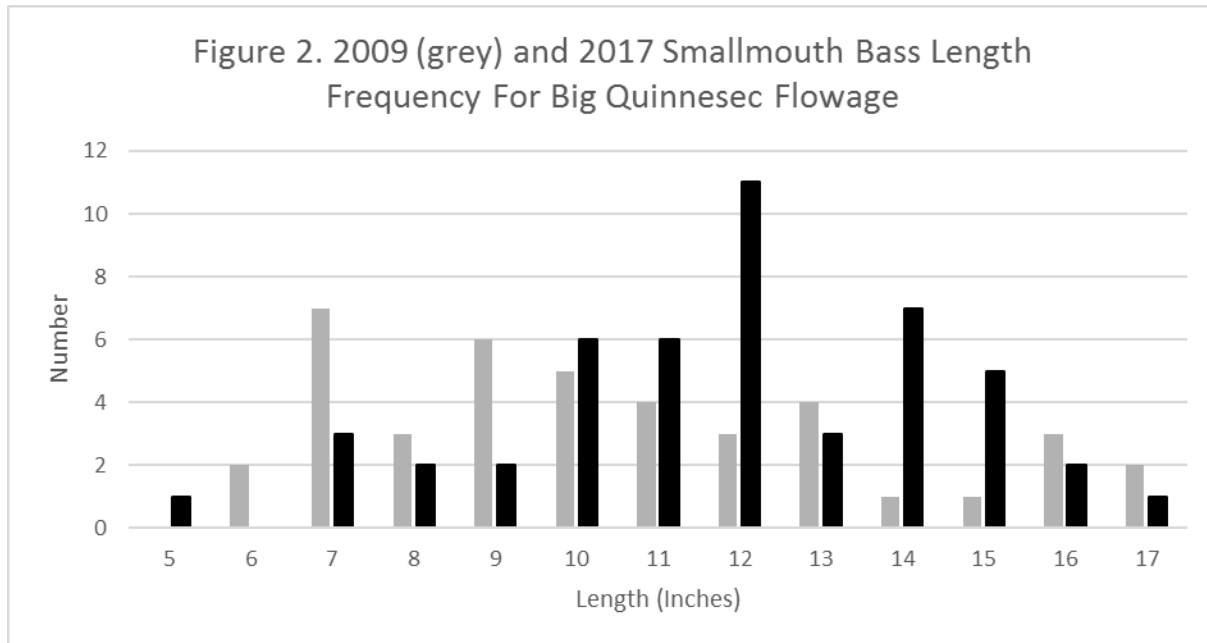
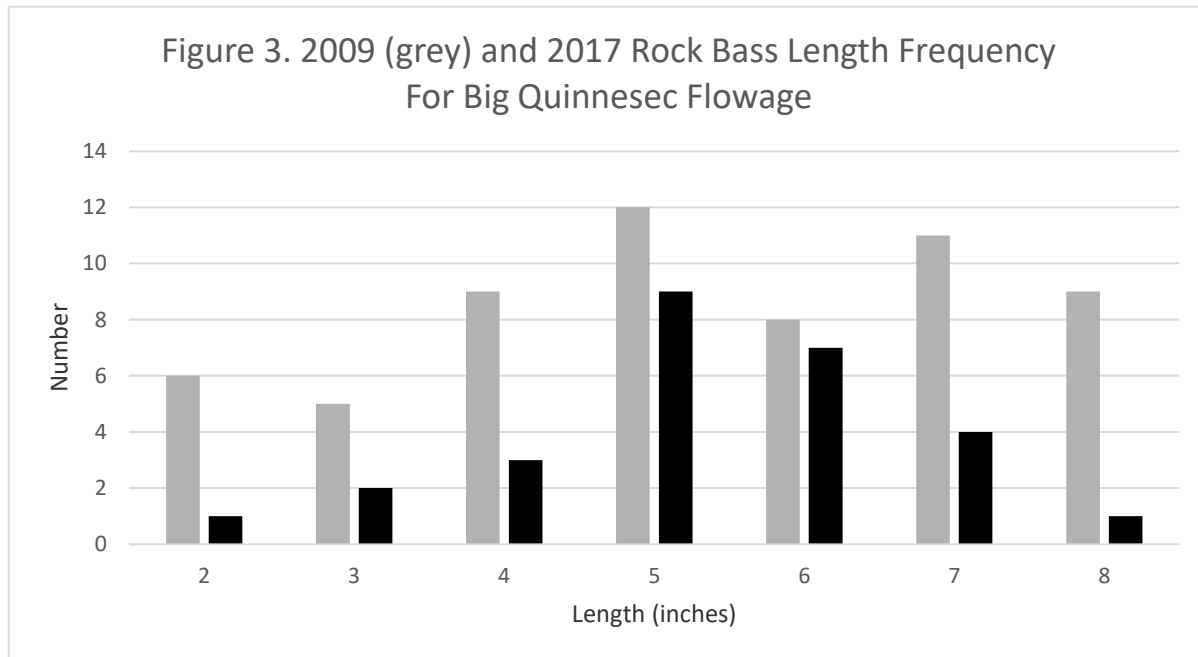


Table 6. The size and age distribution of smallmouth bass captured during the May-September 2017 electrofishing surveys of Big Quinnebec Flowage, Wisconsin- Michigan. Average length at age information from WDNR northern region database (2014) and lengths are inches.

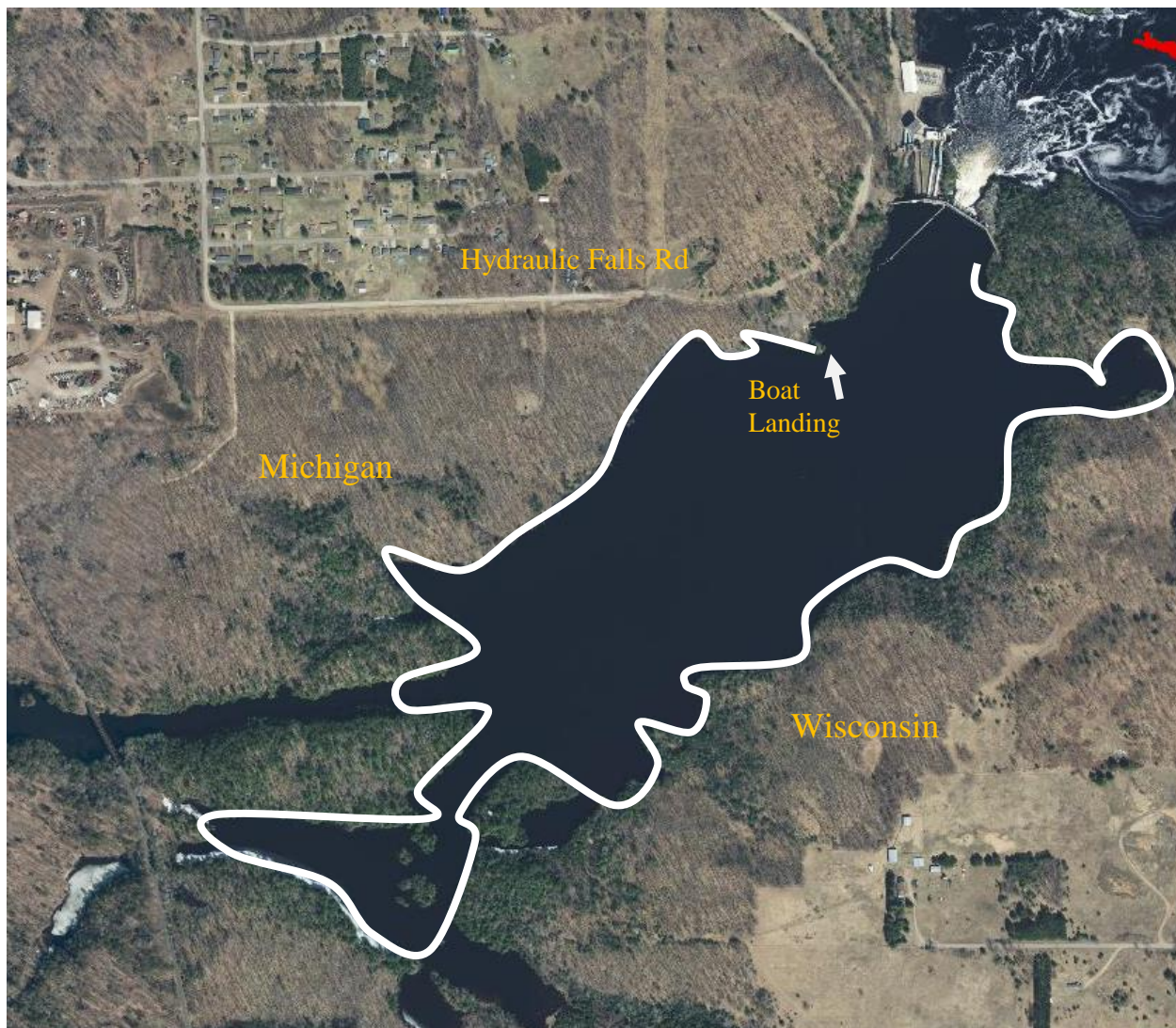
Species	AGE 1	AGE 2	AGE 3	AGE 4	AGE 5	AGE 6	AGE 7	AGE 8	AGE 9	AGE 10	AGE 11	AGE 12	AGE 14
Smallmouth Bass 2017 (Northern Average)	5.1 (4.4)	7.8 (7.1)	8.0 (9.2)	10.2 (11.1)	10.1 (13.3)	12.0 (15.0)	13.3 (15.9)	14.1 (18.0)	15.4 (18.9)	15.6 (19.9)	16.7	16.2 (18.9)	17.6



APPENDIX



Map indicating Niagara, WI as well as Big and Little Quinnesec impoundments



Big Quinnebec Flowage electrofishing route on 3 nights of 2017 (denoted by white line).